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A new report of *Uromyces ambiens* on *Buxus* from Pakistan

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Abstract — The rust fungus, *Uromyces ambiens,* is described and illustrated based on a specimen of *Buxus wallichiana*, Himalayan boxwood, from northern Pakistan. This rare fungus is reported for the first time from this host and for the first time from Pakistan.

Key words — dimorphic spores, Himalayas, *Puccinia buxi*, Shangla

Introduction

During the exploration of *Uredinales* of District Shangla, Khyber Pakhtunkhwa, Pakistan, trees of Himalayan boxwood, *Buxus wallichiana*, were found to be infected with a species of *Uromyces*. Leaves of *B. wallichiana* collected in September 2013 were infected with pale yellowish spermogonial sori. Later samples collected in November and January showed both spermogonial and telial sori. After an extensive literature survey, we identified the rust fungus on *Buxus* as *Uromyces ambiens*.

Another rust fungus, *Puccinia buxi* Sowerby, known as boxwood rust, occurs on many species of *Buxus*. It is widespread throughout Europe but rarely reported on native hosts in China and Japan. The boxwood rust has been intercepted at ports of entry in North America over the past decades and was discovered in Pennsylvania on recently received nursery stock of boxwood from Greece (Yun 2014).

Himalayan boxwood is a medium sized small tree found commonly in the western and central Himalayas at elevations ranging from 1200 to 2900 m (Viswanath et al. 2006). The tree is native to Pakistan and India. In Pakistan, it grows in the sub-Himalayan tract from Azad Kashmir westward to Rawalpindi, Islamabad, Murree, Hazara, Chitral, Swat, Shangla, Rawlakot, and the Gadoon area (Stewart 1972).

Our collections of *Uromyces ambiens* represent a new record for Pakistan as well as a new host record. Pakistan is the second country in which this rare rust on *Buxus* occurs. In addition, this represents the only recent re-description and illustration of this species.

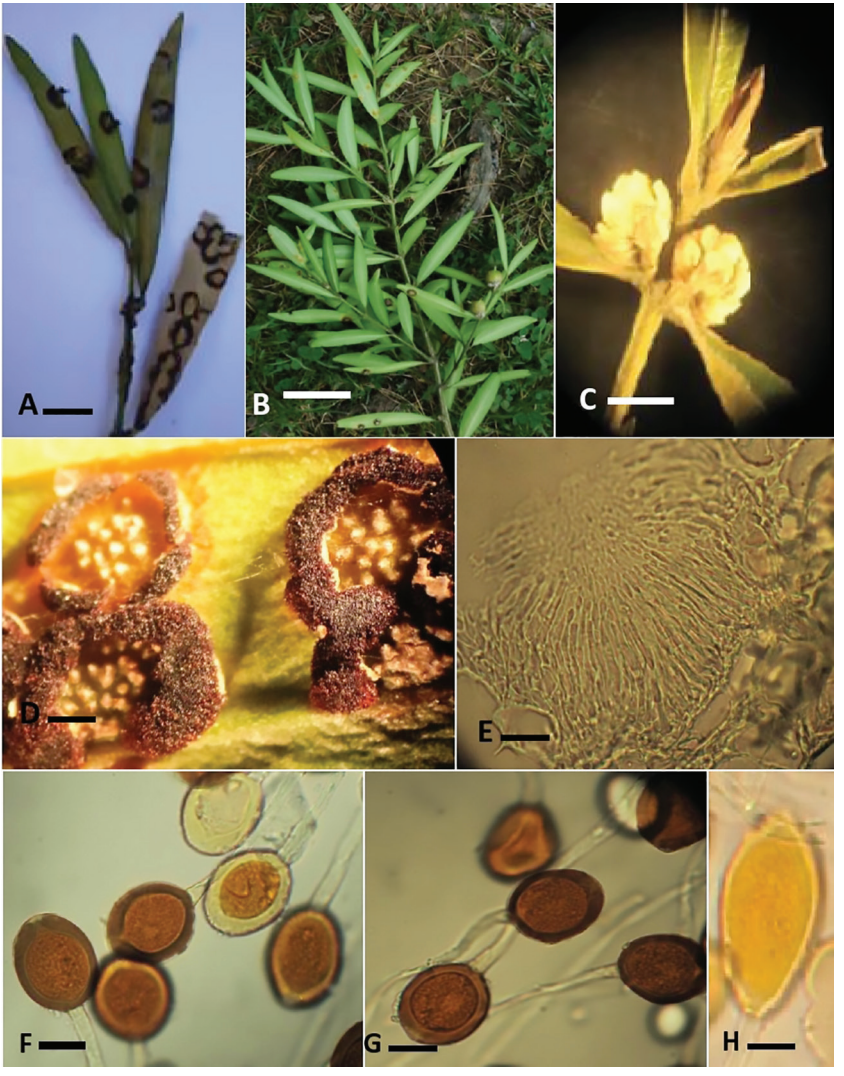

Plate 1: *Uromyces ambiens*. A, B: Leaves of *Buxus wallichiana* showing raised spermogonial and telial sori. C: Inflorescence of *Buxus wallichiana*. D: Telial sori under stereomicroscope. E: Longitudinal section of spermogonium. F–H: Dimorphic teliospores. Scale bar = 10 µm.

Materials & methods

Freehand sections and scrape mounts of infected plant materials were made in lactic acid. The plant was photographed and infected portions were observed under a stereomicroscope. Twenty spores of each spore state were examined under a microscope (Nikon YS 100) and measured using an ocular micrometer (Zeiss Eyepiece Screw Micrometer). Sections and spores were photographed by Digiporo-Labomed. The spores were illustrated with the aid of a camera lucida (Ernst Leitz Wetzlar Germany).

Taxonomy

Uromyces ambiens Cooke, Grevillea 3: 75 (1874) PLATES 1, 2

AECIA and UREDINIA not found. SPERMOGONIA subepidermal, group 1, type 1, golden brown to hyaline, 175 × 137 µm. TELIA abaxial, raised, developing as circular black boundaries around central yellow spots, scattered, naked, chestnut brown, 2–3 × 4–5 mm. TELIOSPORES dimorphic: ovate teliospores yellow, elongated, 1-celled, 29–40 × 48–60(–79), walls smooth, yellow; globose to subglobose teliospores brown, 29–47 × 39–48 µm, walls smooth and dark

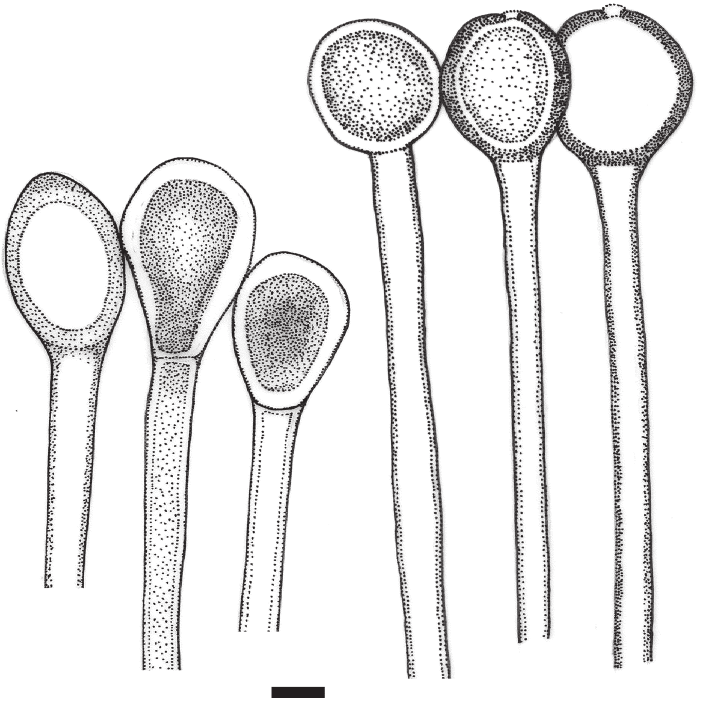

PLATE 2: *Uromyces ambiens:* teliospores. Scale bar = 10 µm.

brown, 2.8–5 µm thick at sides, up to 3.5 µm thick apically, germ pore one, subapical to apical; pedicel hyaline, 6.5–9 × 160–205(–285) µm.

Material examined: **PAKISTAN**, **Khyber Pakhtunkhwa**, Shangla district, Yukhtange, at 2200 m a.s.l., on *Buxus wallichiana* Baill. (*Buxaceae*), stages 0 + III, 2 Sep. 2013, A.N. Khalid AM-S1 (LAH 20914); 4 Nov. 2013, Sadiqullah RS 36A (LAH 20913A); 1 Jan. 2014, Sadiqullah RS 36B (LAH 20913B).

Comments: Cooke (1874) originally described *Uromyces ambiens* on *Buxus sempervirens* L. from the Indian Himalayas, and Sydow (1922) published a revised and expanded description of the type collection. Later Butler & Bisby (1931) reported this species on leaves of *Buxus* (probably *sempervirens*) near Dunooltie above Dehra Dun as well as from Bashahr, near Simla, 6000 ft. elevation. Although Spaulding (1961) listed *U. ambiens* as present in India and Pakistan, we found nothing in the Pakistani literature about this rust.

Uromyces ambiens differs morphologically from *Puccinia buxi.* In *U. ambiens* the teliospores are dimorphic (ovate or globose to subglobose), non-septate, and thick-walled (up to 5 um thick on the sides), while *P. buxi* has only monomorphic teliospores that are oblong to clavate, one-septate, and thin-walled.

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